Updates on recon impact assessments

2022 TCORF

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Outline

- Dropsonde impact assessment funded by 2018 Hurricane Supplemental
- G-IV Inner Circumnav Assessment funded by 2018 Hurricane Supplemental
- HDOB/sonde impact assessment for GFSv16 upgrade

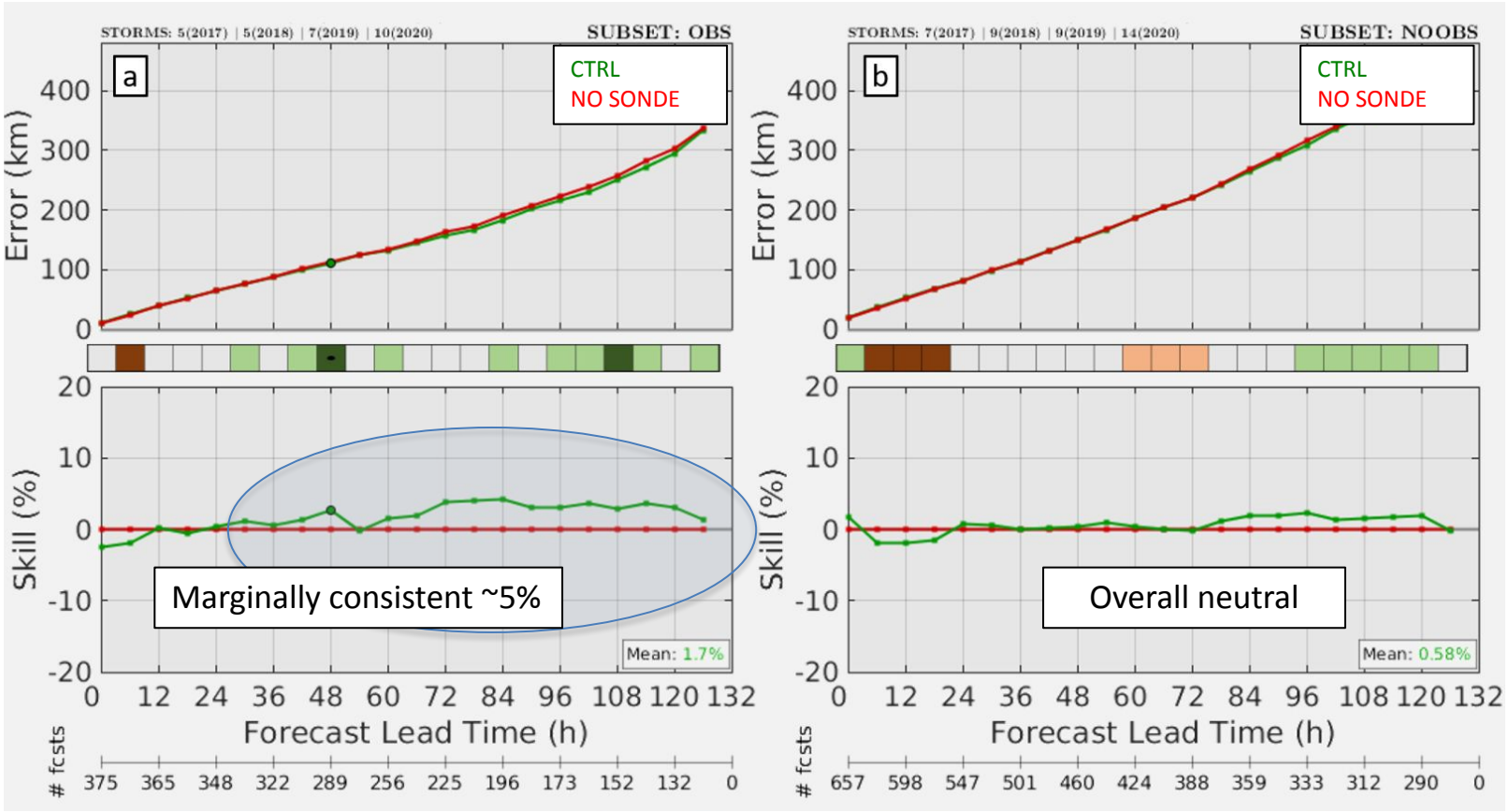
Dropsonde impact: Outline

- Basin-scale H220 (e.g., version of HWRF where storms run in regional domain)
- Active periods of 2017-2020
- Compare **direct** (cycles with recon) vs **indirect** (cycles without recon) impacts
- Only late model assessed
- Consistency assessed across multiple statistical metrics (mean absolute error, median error, FSP)

Dropsonde impact: Track

DIRECT

INDIRECT



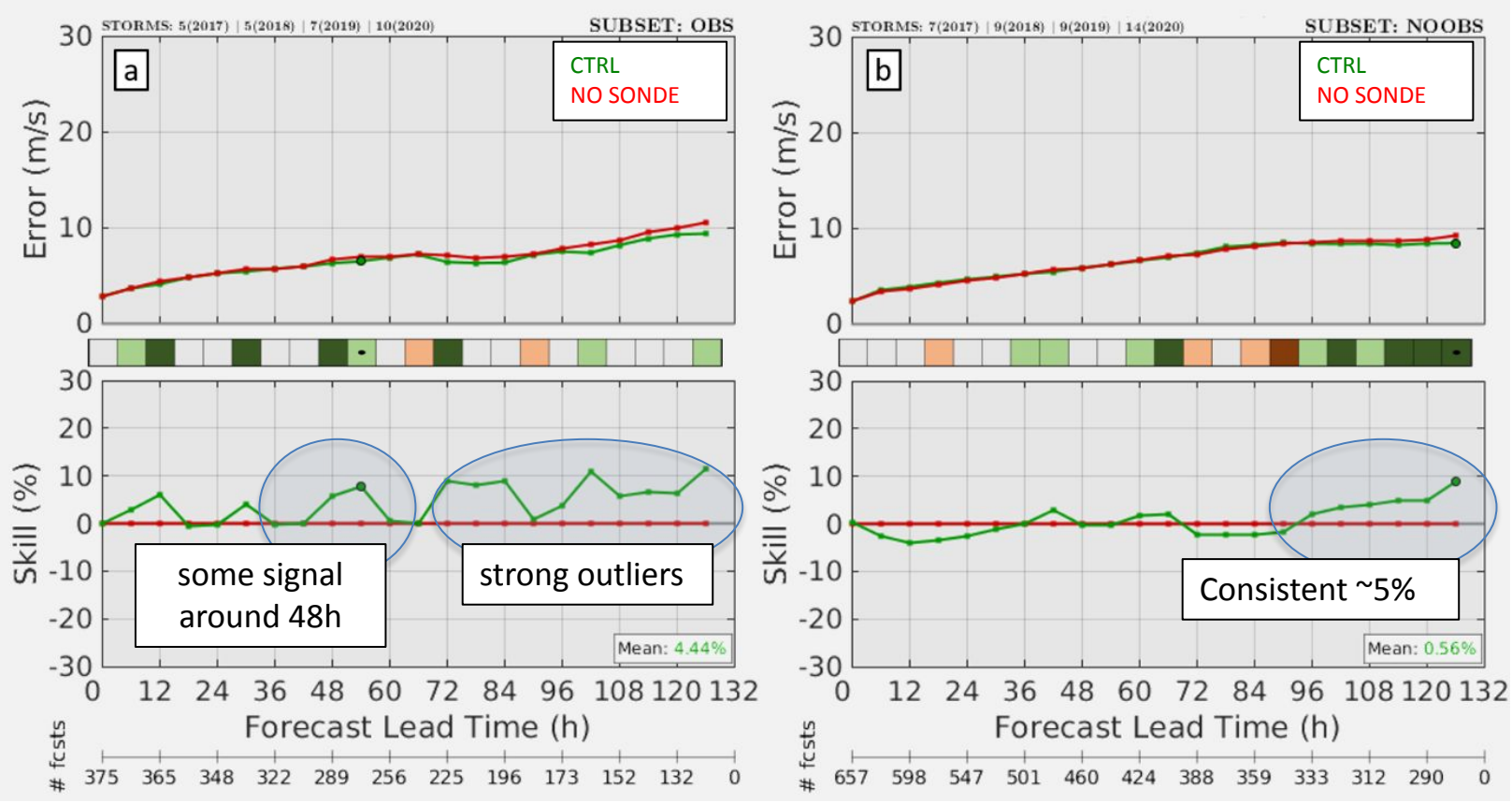
Consistent improvement

Consistent degradation

Dropsonde impact: Vmax

DIRECT

INDIRECT



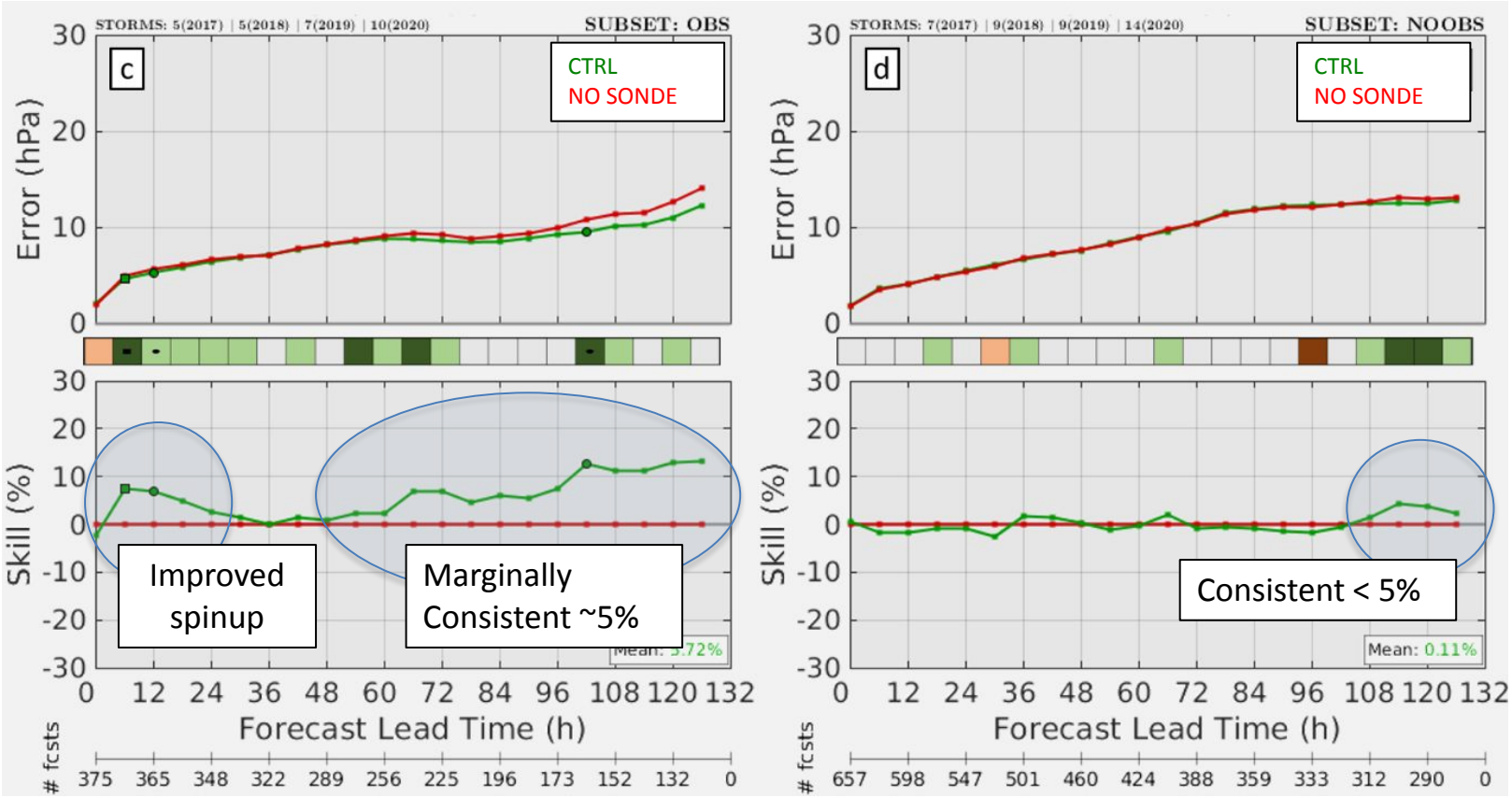
Consistent improvement

Consistent degradation

Dropsonde impact: Pmin

DIRECT

INDIRECT



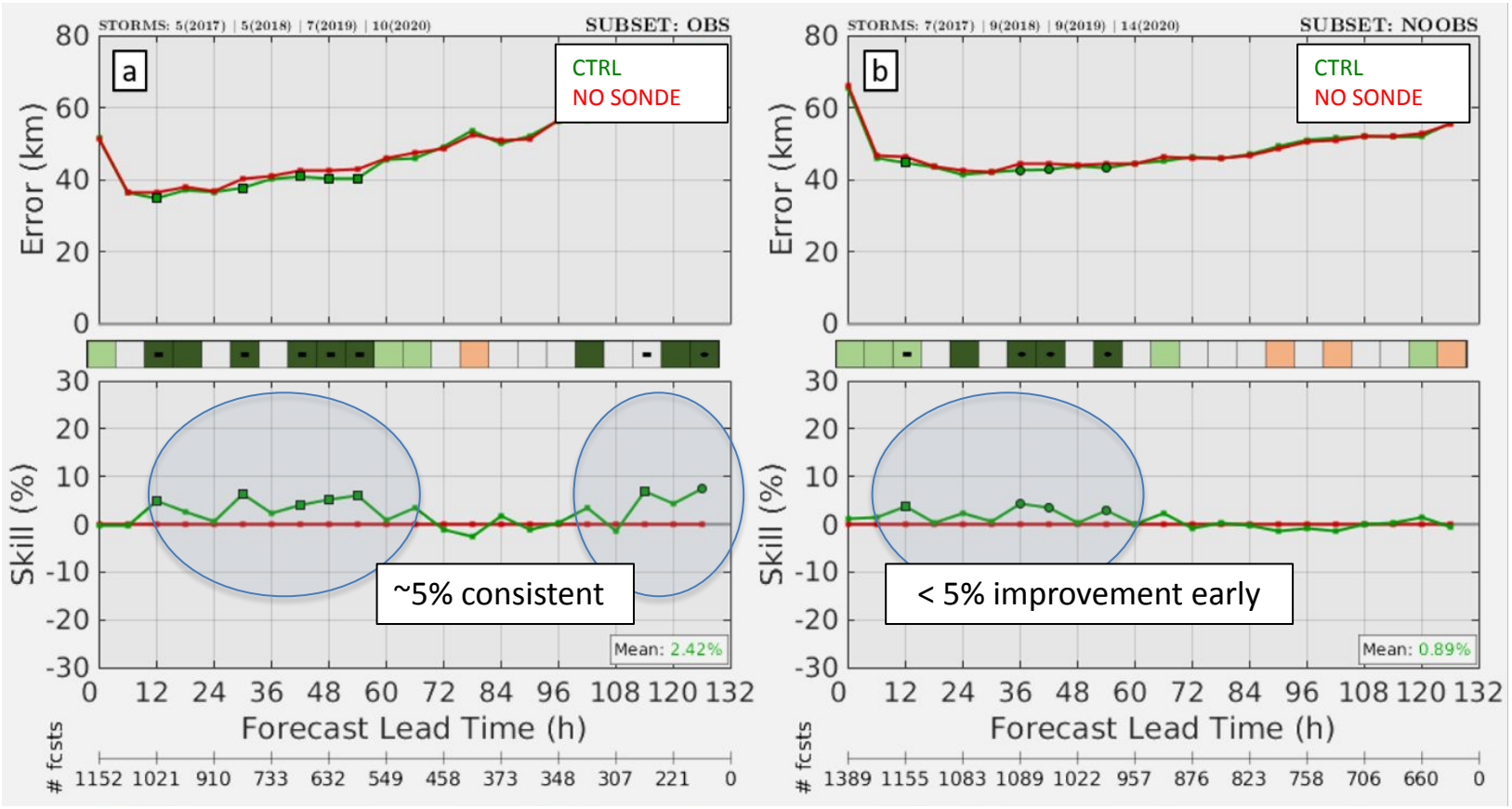
Consistent improvement

Consistent degradation

Dropsonde impact: R34

DIRECT

INDIRECT



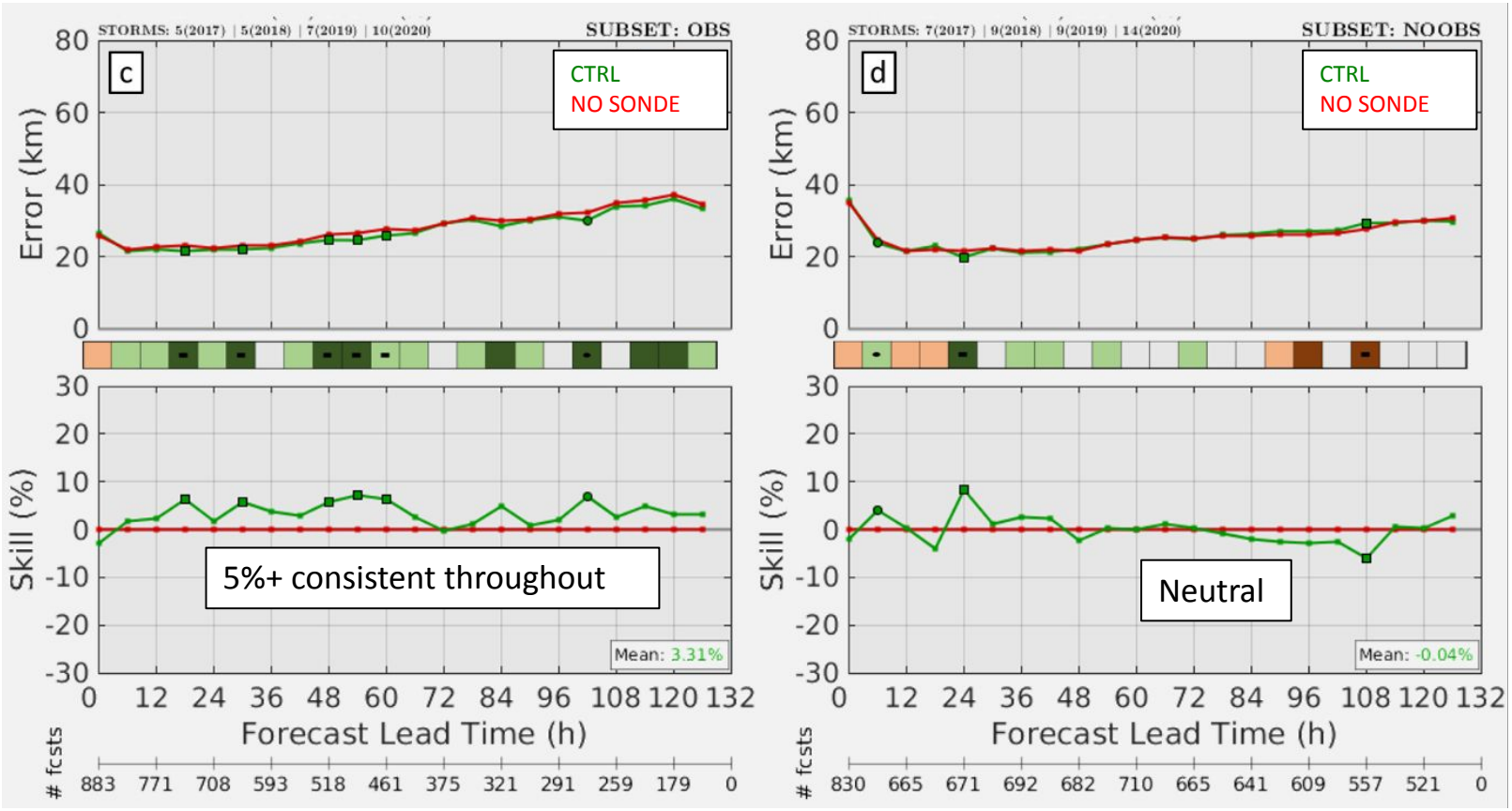
Consistent improvement

Consistent degradation

Dropsonde impact: R50

DIRECT

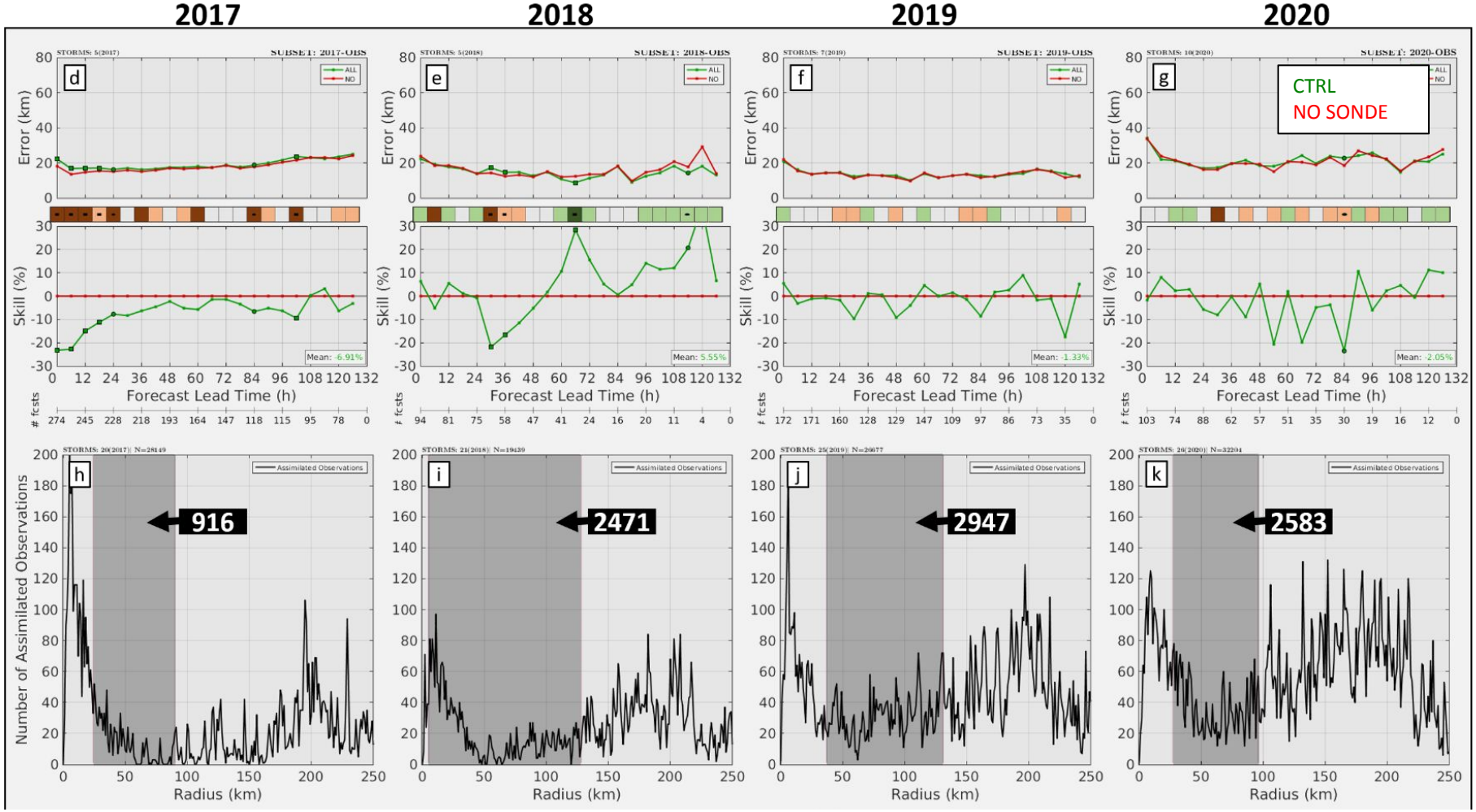
INDIRECT



Consistent improvement

Consistent degradation

Dropsonde impact: R64



Degraded

Overall neutral

Dropsonde impact: Summary

Sampling with dropsondes:

- Directly and consistently improves track, SLP, and storm structure
- Reduces number of large Vmax MAE outliers, but generally does not improve median Vmax error or FSP
- Indirectly and consistently improves intensity and structure at later lead times

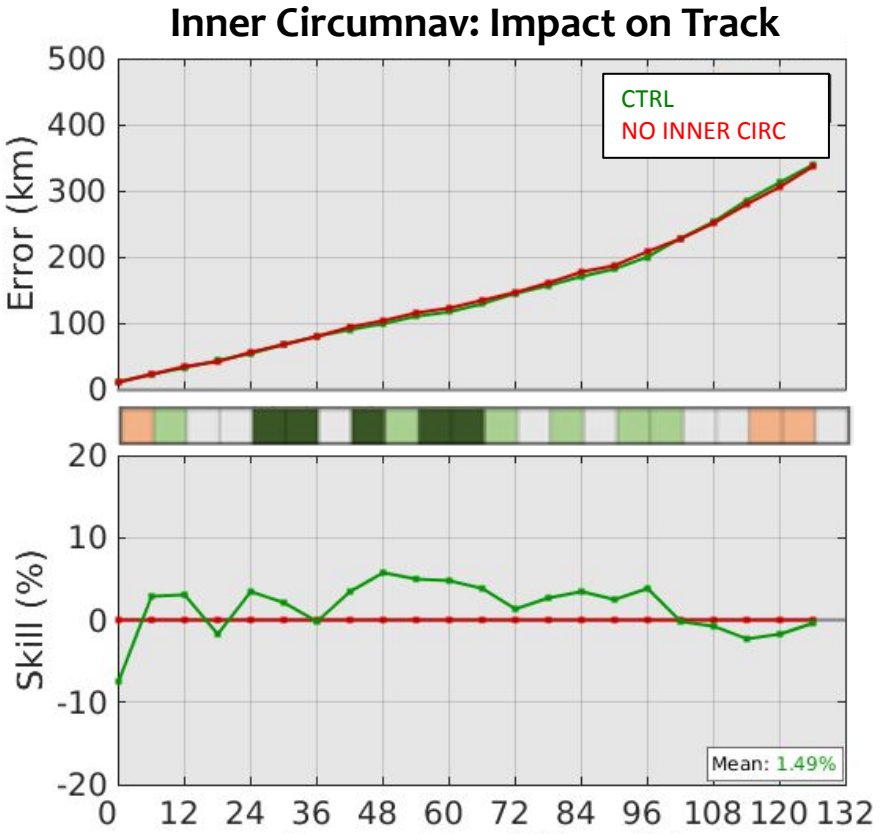
R64 degrades if you don’t have enough sondes within/near R64

G-IV Inner Circumnav

- Basin-scale H220 (e.g., version of HWRF where storms run in regional domain)
- Removed inner-circ dropsonde data in Florence, Michael, Dorian, Laura, Marco
- Assessed impact on all storms/cycles with recon
- Only late model assessed

G-IV Inner Circumnav

- Mostly positive track impacts seen from Day 1-4
- Consistent improvements up to 5%
- Intensity impact is neutral



GFS recon impact: Outline

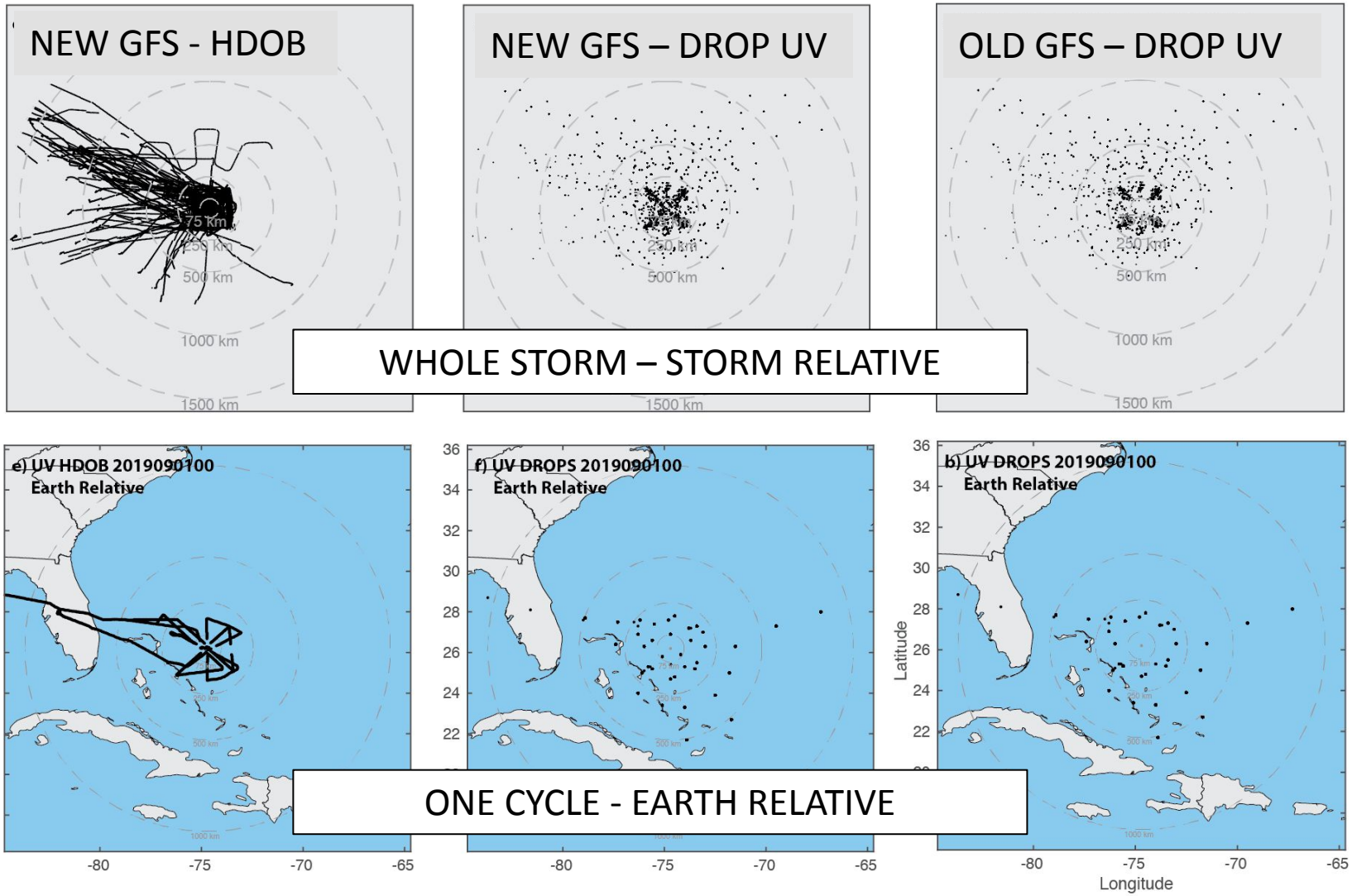
GFS16 pre-implementation trials

- HDOB u/v/T added
- Sonde rejection region changed from 111 km for ALL TC to 55 km for ONLY hurricanes (many more sondes make it in)
- Still no consideration of dropsonde drift

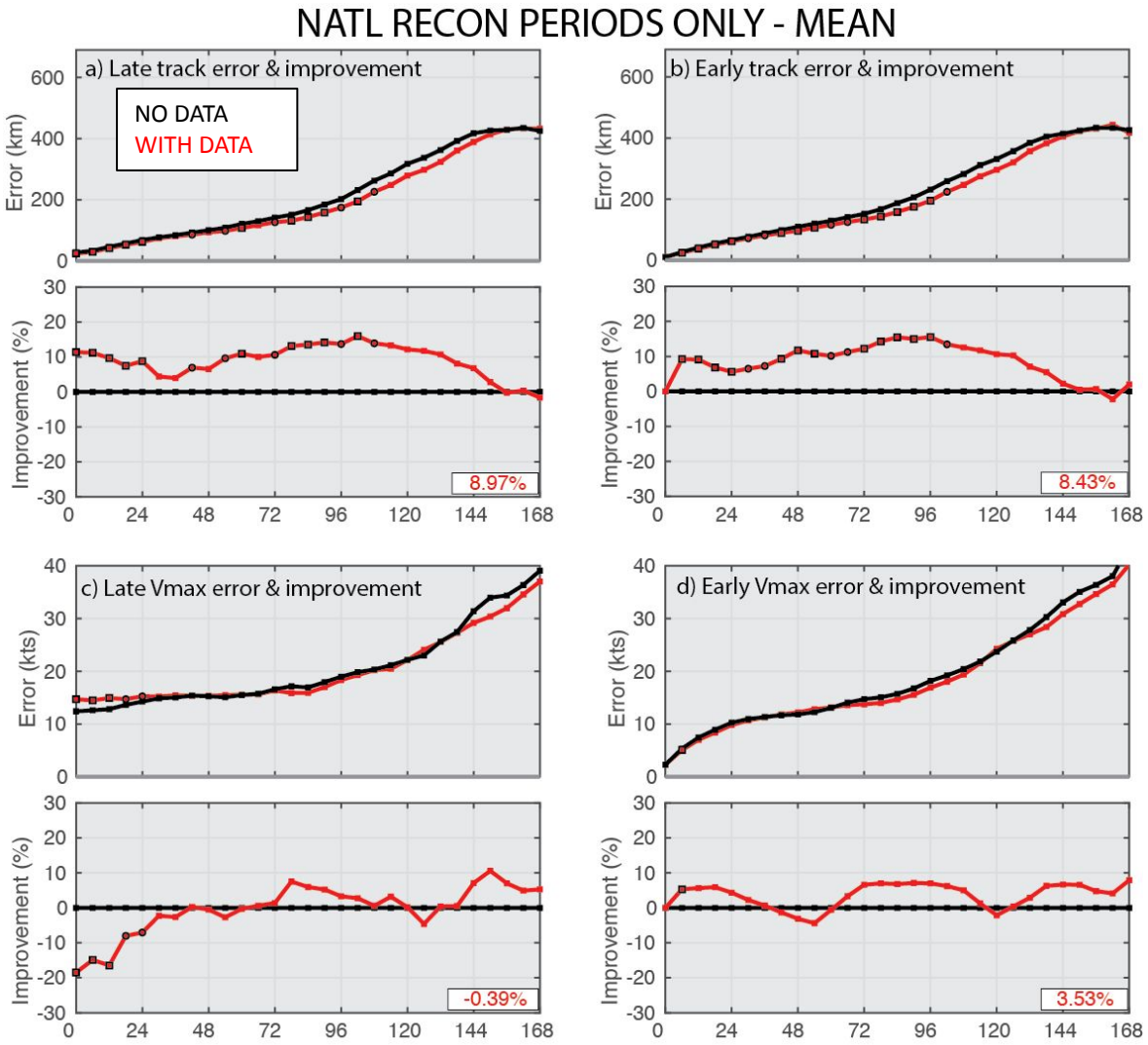
Periods from 2018-2020 considered

Only direct impacts assessed

GFS recon impact: Dorian example



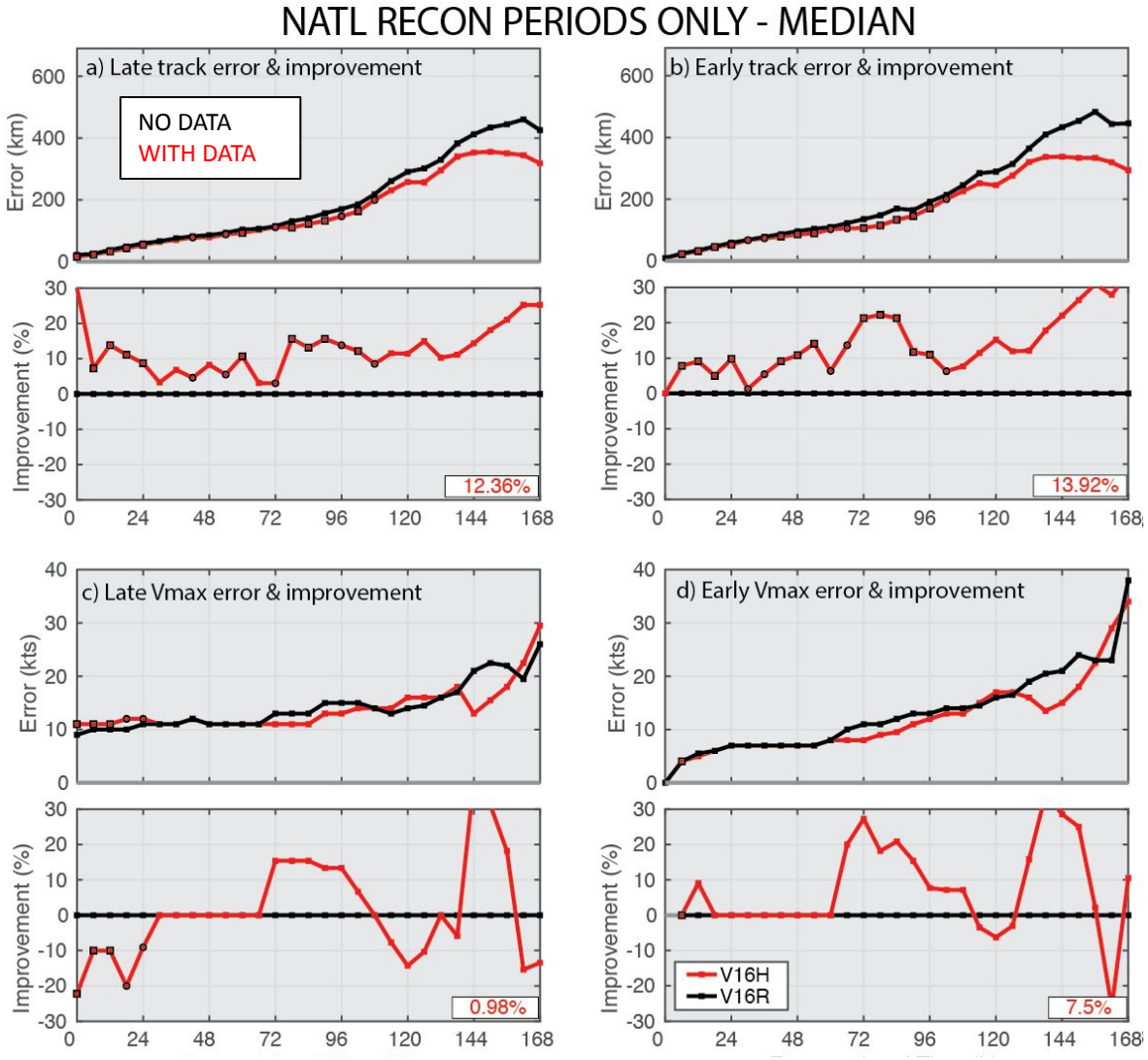
GFS recon impact: Direct (MAE)



Significant track improvement through D4+ in both early and late models

Improved intensity in early model

GFS recon impact: Direct (median)

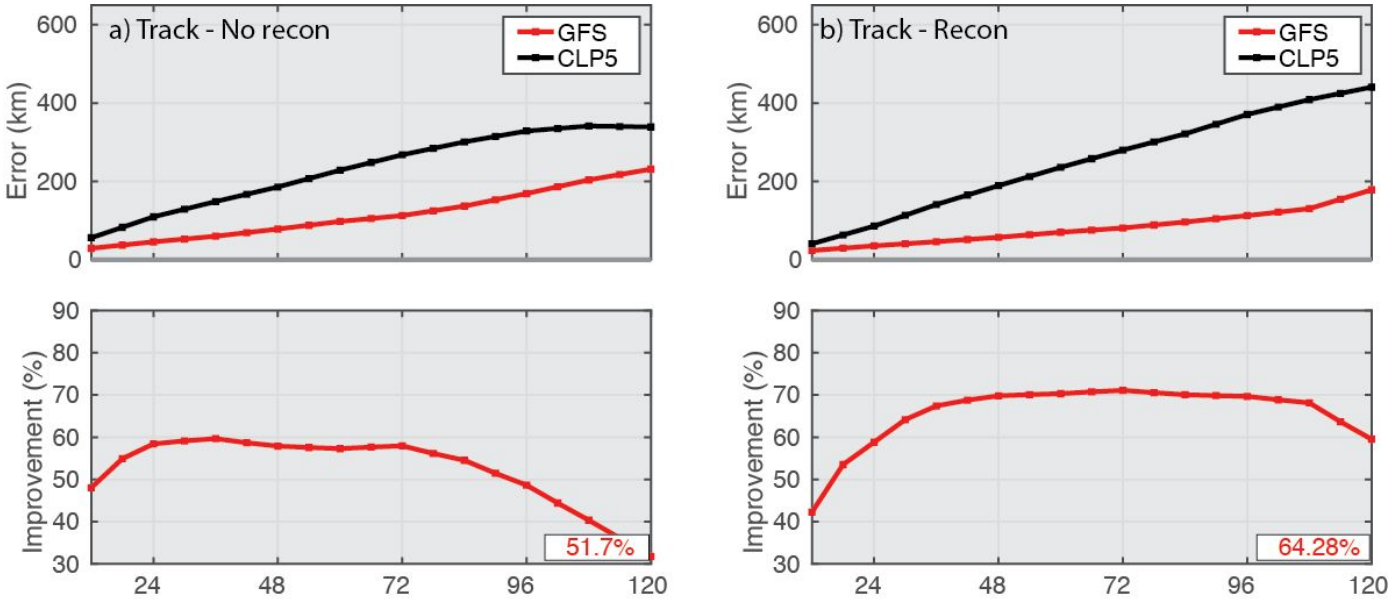


Very large track improvement D5-7 not seen in MAE (smaller sample, outliers)

More substantial intensity improvement than with MAE

GFS recon impact: Summary

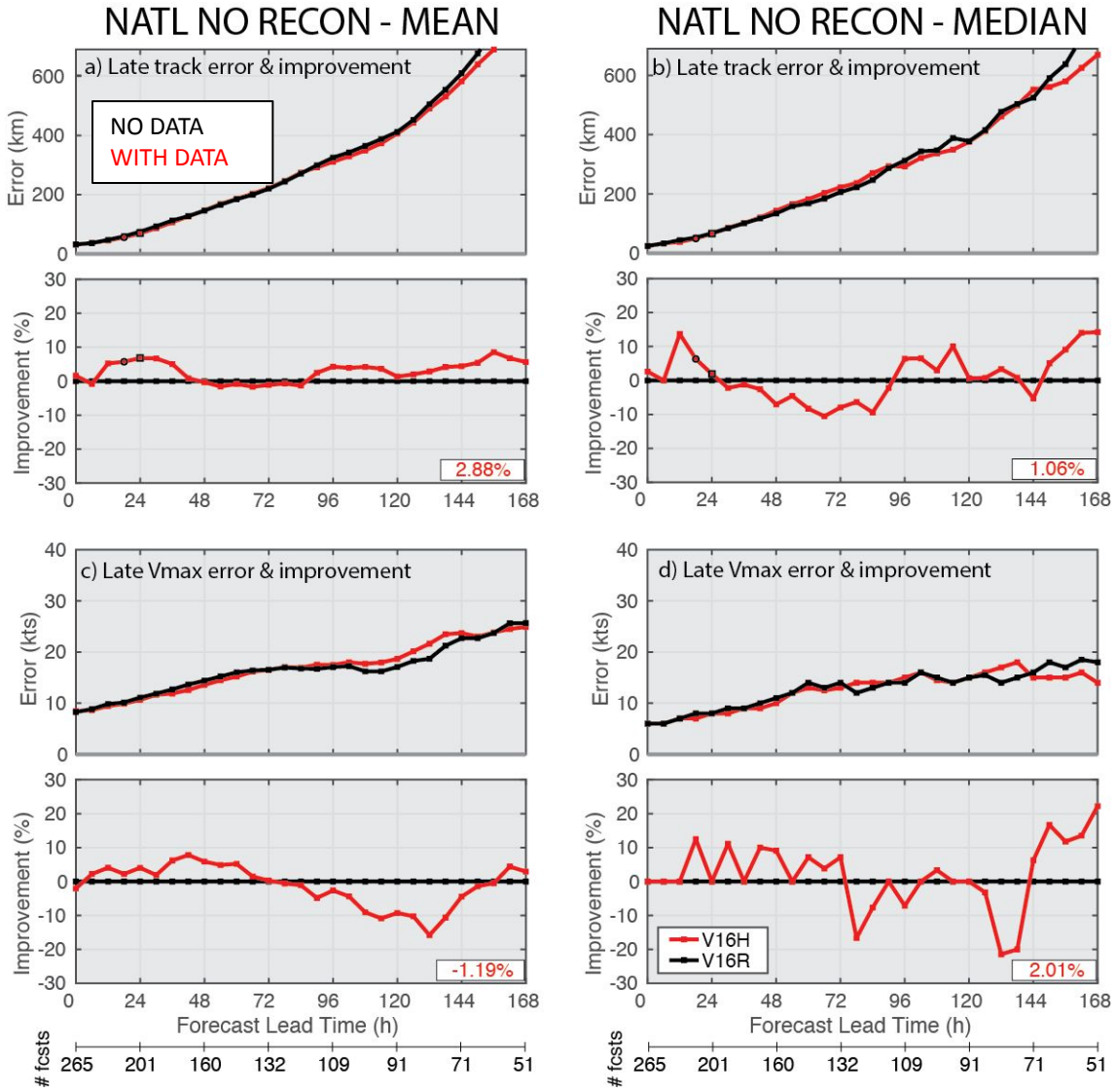
- Quite large track impacts from added HDOB/drops in GFS
- Track MAE improves through D5, median suggests large D6-7 improvement as well
- Smaller intensity improvements
- Overall, GFS performs FAR better when recon present (below)



2021 GFS track skill: Recon vs. No recon

BONUS SLIDES

GFS recon impact: Indirect (late)

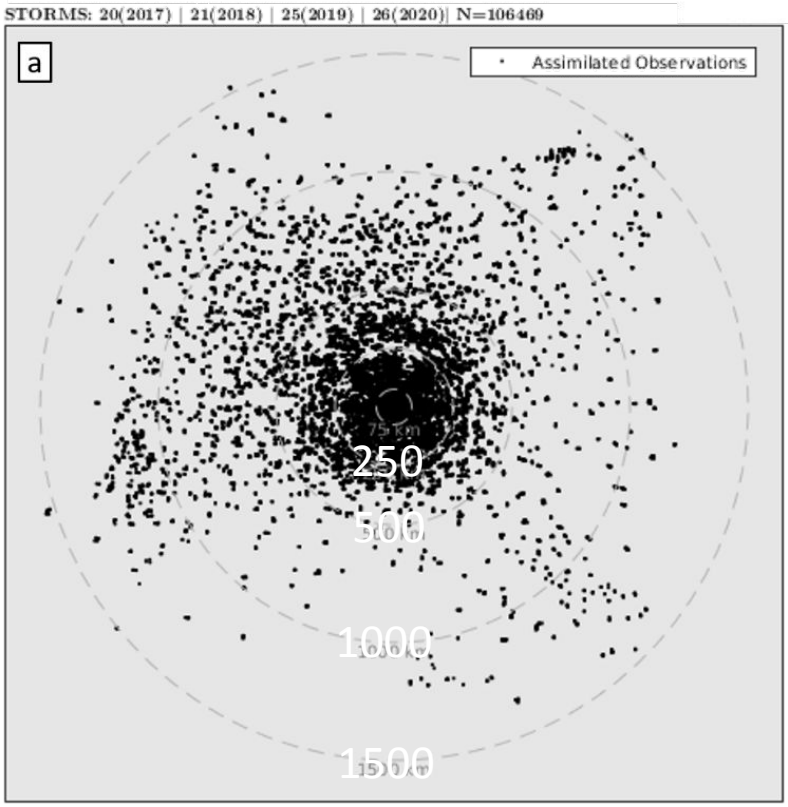


Some improvement observed in non-recon storms, probably due to outliers

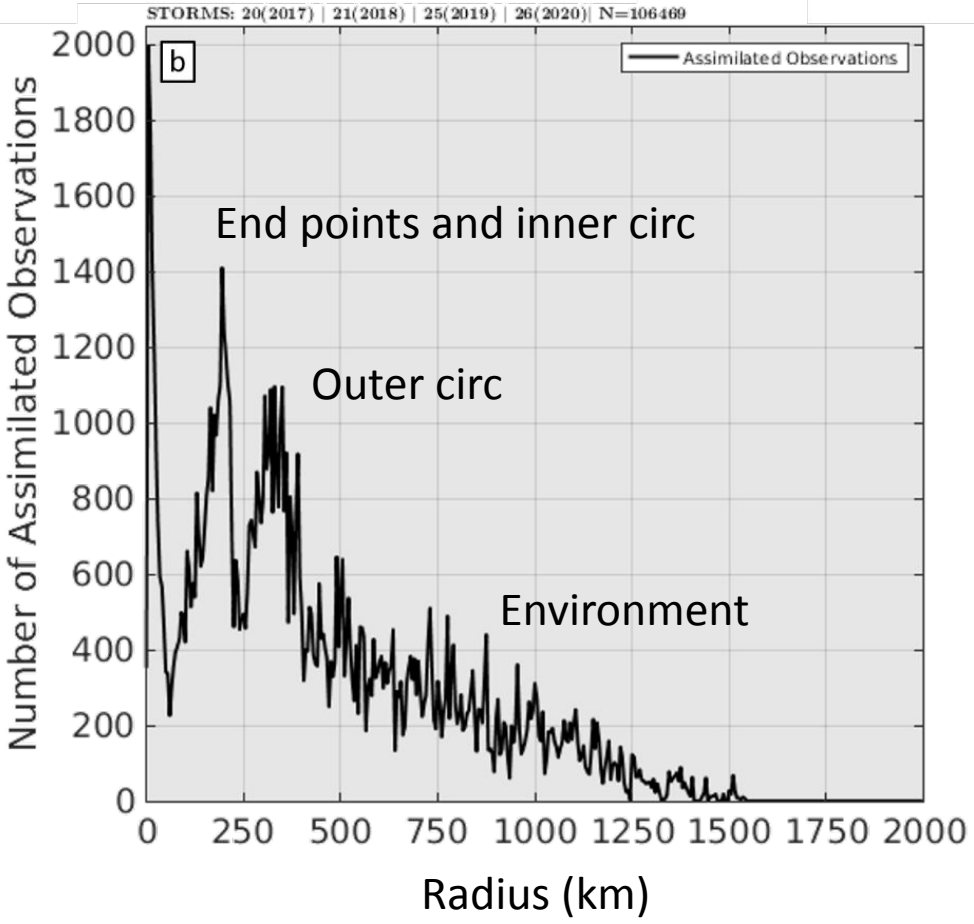
No meaningful impact on intensity

Dropsonde impact: Distribution

PLAN VIEW



RADIAL VIEW



Dropsonde impact: Recon Storm list

2017	**2018**	**2019**	**2020**
Harvey	Florence	Dorian	Gonzalo
Irma	Gordon	Erin	Hanna
Jose	Isaac	Fernand	Isaias
Katia	Kirk	Humberto	Laura
Maria	Michael	Jerry	Marco
		Karen	Paulette
		Lorenzo	Sally
			Teddy
			Vicky
			Beta

GFS recon impact: Storm list

2018	2019	2020
Florence	**Dorian**	**Cristobal**
Gordon	Erin	**Gonzalo**
Helene	**Fernand**	**Hanna**
Isaac	Gabrielle	**Isaias**
Joyce	**Humberto**	Ten
	Imelda	
	Jerry	
	Karen	
	Lorenzo	